

### Claims

1. A process in which material comprising an aqueous liquid with dispersed particulate solids is pumped as a fluid then allowed to stand and rigidify and the rigidification is improved whilst retaining the pumpability of the material by combining polymeric particles with the material during or prior to pumping the material,  
wherein the polymeric particles comprise water soluble polymer which has an intrinsic viscosity of at least 3 dl/g.
2. A process according to claim 1 in which the water soluble polymer is anionic and is preferably formed from ethylenically unsaturated water-soluble monomer or blend of monomers comprising ,  
(a) anionic monomers selected from ethylenically unsaturated carboxylic acid and/or sulphonic acid monomers,  
and optionally (b) nonionic comonomers, preferably selected from the group consisting of (meth)acrylamide, hydroxy alkyl esters of (meth)acrylic acid and N-vinyl pyrrolidone.
3. A process according to claim 1 and claim 2 in which the polymeric particles have an average particles size of less than 10 microns.
4. A process according to claim 3 in which the polymeric particles are added to the material in the form of a reverse phase emulsion or dispersion, or as a dispersion in an aqueous medium or as bonded friable aggregates of primary particles of particle size less than 10 microns which at least 90% by weight of the aggregates have a size of more than 50 microns.
5. A process according to claims 1 or claim 2 in which the polymeric particles are added to the material as substantially individual particles of particle size greater than 20 microns, preferably greater than 50 microns.
6. A process according to any one of claims 1 to 5 in which the dispersed particulate solids of the material are mineral.
7. A process according to any one of claims 1 to 6 in which the dispersed particulate solids of the material have particle sizes less than 100 microns, in which preferably at least 80% of the particles have sizes less than 20 microns.

8. A process according to claims 1 to 7 in which the polymer particles are in the form of an aqueous dispersion comprised of (a) a liquid dispersing medium consisting mainly of salt solution which comprises at least 25% by weight of inorganic salt based on total weight of dispersing medium; and (b) a water-soluble vinyl addition non-ionic or anionic polymer, and that is insoluble in said salt solution,

wherein said polymer is formed from ethylenically unsaturated monomers consisting of acrylic acid (or salts), optionally (meth)acrylamide and optionally at least one cross-linking monomer containing at least two polymerisable ethylenically unsaturated groups and

wherein the inorganic salt comprises a Group II metal halide.

9. A process according to claim 8 in which the group II metal halide is calcium chloride and the concentration of calcium chloride in the dispersing medium is at least 35%, preferably around 39%.

10. A process according to any one of claims 1 to 9 in which the material has a solids content in the range 15% to 80% by weight, preferably in the range 40% or 50% to 70% by weight, more preferably 55% to 65% by weight.

11. A process according to any one of claims 1 to 10 in which the material comprised red mud from the Bayer alumina process.

12. A process according to any one of claims 1 to 11 in which the material is pumped to an outlet, where it is allowed to flow over the surface of previously rigidified material, wherein the material is allowed to stand and rigidify to form a stack.

13. An apparatus for treating a suspension of particulate material with a solid particulate treatment chemical, comprising

a means for extracting the suspension from a flow line,

and a mixing chamber,

comprising,

a circular wall,

an opening at the top and at the base in which the radius of the top is greater than the radius of the base,

a means for delivering the particulate treatment chemical into the mixing chamber and

a means for conveying the treated suspension from the mixing chamber.

14. An apparatus according to claim 13 in which the means for delivering the particulate treatment chemical into the mixing chamber, includes a screw feeder.

15. An apparatus according to claim 13 or claim 14 in which the means for conveying the treated suspension from the mixing chamber includes a helical rotor pump.

16. A process in which a suspension is treated by mixing with a particulate treatment chemical, comprising,  
flowing the suspension along a flow line  
taking a portion of the suspension and flowing it into a mixing chamber, where it is combined with the particulate treatment chemical and then returned to the flow line,  
characterised in that the suspension enters the mixing chamber and forms a vortex into which the particulate treatment chemical is fed.

17. A process according to claim 16 in which the particulate treatment chemical comprises water soluble polymer.

18. A process according to claim 16 or claim 17 in which the particulate treatment chemical has a particle size of at least 20 microns, preferably at least 50 microns.